

MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for January, 1905, is based on data from about 3583 stations, classified as follows:

Weather Bureau stations, regular, telegraph, and mail, 176; West Indian Service, cable and mail, 4; River and Flood Service, regular 52, special river and rainfall, 363, special rainfall only, 98; voluntary observers, domestic and foreign, 2565; total Weather Bureau Service, 3258; Canadian Meteorological Service, by telegraph and mail, 33; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 1; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander H. M. Hodges, Hydrographer, United States Navy; H. Pitier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological

Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; and Señor Enrique A. Del Monte, Director of the Meteorological Service of the Republic of Cuba.

Attention is called to the fact that at regular Weather Bureau stations all data intended for the Central Office at Washington are recorded on seventy-fifth meridian or eastern standard time, except that hourly records of wind velocity and direction, temperature, and sunshine are entered on local standard time. As far as practicable, only the seventy-fifth meridian standard of time, which is exactly five hours behind Greenwich time, is used in the text of the REVIEW. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is $157^{\circ} 30'$, or $10^{\circ} 30'$ west of Greenwich. The Costa Rican standard meridian is that of San José, $5^{\circ} 36'$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

During January an unusually large number of storms passed off to sea by way of Nova Scotia and Newfoundland, and barometric pressures were, therefore, generally low over the western North Atlantic. Pressures were relatively high, in this region from the 6th to the 13th, and from the 29th to 31st, and were high between Bermuda and the south Atlantic coast from the 16th to the 19th. Over the Azores, pressures were generally high, except from the 12th to the 15th, when a disturbance of considerable strength moved northeastward over the islands. The observatory at Horta reported a minimum pressure of 29.40 inches on the 13th, and a maximum wind velocity of 48 miles an hour on the 14th. Over the British Isles, pressures were high from the 1st to the 4th, low from the 5th to the 12th, high on the 13th, low from the 14th to the 20th, and generally high during the remainder of the month. The storm that passed over the Azores on the 13th reached the Irish coast with much increased intensity on the 14th, when Valencia reported a barometer reading of 28.82 inches. During the passage of this storm high winds and gales were reported from all coast stations of the United Kingdom, and considerable damage was sustained by shipping, particularly by small fishing craft.

In the United States several storms of moderate intensity passed along the Gulf coast, and then up the Atlantic coast, increasing somewhat in strength as they progressed. A number of storms passed over the northern part of the country and off to sea by way of the north Atlantic coast. On the 3d a storm center that had traversed the Missouri and Ohio valleys, increasing in strength, reached the

Virginia coast with central pressure 29.38 inches. It then passed up the Atlantic coast; at 8 a. m. of the 4th the center was off the Massachusetts, and at 8 p. m. off the Nova Scotia coast. Rain preceded this storm in the New England and Middle Atlantic States, turning into snow with rapidly falling temperature. The snowfall was heavy and drifted badly in many localities, delaying traffic on steam and electric roads. New York City and vicinity suffered particularly in this respect. The winds along the coast reached velocities as high as 60 miles an hour and occasioned some loss to shipping. Ample warnings had been given of the approach of this storm. On the 25th a storm center that had traversed the Lake region, and another that had moved up the Atlantic coast, united off the New Jersey coast and formed a disturbance of considerable strength. This storm center moved up the coast, increasing in intensity, and at 8 p. m. was central over Cape Cod. At 8 a. m. of the 26th it was near Sydney. High winds were reported along the middle Atlantic and New England coast and a number of vessels was driven ashore. Some damage was sustained but no lives were lost. Heavy snow drifted by high winds delayed railroad and street car traffic in many places, and the low temperature which accompanied the snow and wind caused much inconvenience and in some cases loss of life. Ample warnings of this storm had been given by the Weather Bureau, and by keeping vessels in port, shipping interests avoided serious loss. Very few storms appeared off the Pacific coast during the month, and these were unaccompanied by winds of great violence.

The first cold wave of the month appeared over the Dakotas

and Minnesota on the 2d. On the 3d it covered Minnesota, Iowa, Illinois, Indiana, Ohio, West Virginia, and western Pennsylvania. On the 4th, it reached the Atlantic coast, and freezing temperatures were reported into northern Florida. On the 9th a cold wave covered Minnesota, the Dakotas, and northern Nebraska with temperatures of zero or below. On the 10th it extended over the Ohio and upper Mississippi valleys, with the line of zero temperature extending into northern Illinois, Indiana, and Ohio. This cold wave lost its intensity before reaching the Atlantic coast. From the 10th to the 12th temperatures were falling gradually but steadily over the region between the Mississippi River and Rocky Mountains, and the 13th, 14th, and 15th freezing temperatures occurred to the southern Texas coast. On the 15th and 16th temperatures of freezing or lower occurred along the east Gulf coast and into northern Florida. The most severe cold wave of the month appeared over the Dakotas, Minnesota, Nebraska, and Iowa on the 24th, and on the 25th covered the central and upper Mississippi Valley and extended over the northern portions of the east Gulf States, the line of zero temperature reaching into northern Tennessee. On the 26th, the cold wave covered Florida, and temperatures below freezing were reported as far south as Tampa and Jupiter. At the latter place the minimum temperature, 24°, equalled the lowest ever recorded since the establishment of the Weather Bureau station at that point, the lowest previous minimum having occurred December 29, 1894. Considerable damage was done to orange trees where groves could not be fired or protected. Ample warnings had been given of the expected low temperatures, and the Morning Tribune of Tampa in an editorial of January 26, estimates that—but for the prompt and ample warnings given by the Weather Bureau office, and the precautions immediately taken upon receipt of these warnings by farmers and growers, the damage would have been about ten times what it really is.

Temperatures during the first decade of the month were generally below normal east of the Rocky Mountains and about normal to the west. During the second decade they were above normal in the Pacific coast States and generally below in all other portions of the country. During the third decade temperatures were above normal in the Pacific coast States and the Rocky Mountain and Plateau regions, and below normal over the Mississippi Valley and eastward to the Atlantic.

The precipitation during the month was above normal in New England, on the east Gulf coast, and in the Southwest, and generally below normal in other parts of the country. On the north Pacific coast the month was remarkably dry.

NEW ENGLAND FORECAST DISTRICT.

The weather was considerably colder than the average for the month. The precipitation, generally snow, was somewhat in excess, except in Connecticut, where it was generally below the average. Several severe storms passed over the section during the month, the most conspicuous of which were those of the 3d–4th, 6–7th, and 24–25th. The first and last of these were accompanied by snow, with high winds and gales, while that of the 6–7th was attended with snow, sleet and rain, and severe gales. Shipping, railroad and street-car traffic, and business generally were greatly delayed and inconvenienced by the stress of weather, and several persons perished in and about Boston from exposure to the stormy weather and low temperature. The storm of the 24–25th was of unusual severity, and the gales, on account of the accompanying very low temperature and heavy snow, were considered the worst since the hurricane of November 26–27th, 1898. The storm resulted in great damage to property, but in little, if any, loss of life. Not less than fifteen vessels were driven ashore along the New England coast, and beach property throughout the coast suffered great damage, the loss amounting to millions of dollars. The fact that Minots Ledge Lighthouse, distant about 20 miles from Boston, was threatened, gives some idea of the un-

usual force of the wind and the water. The storm warnings during the month, thirteen in number, were issued well in advance of the storms, and resulted in the saving of many lives and prevented the loss of much property. No storms passed over the district for which warnings were not issued.—*J. W. Smith, District Forecaster.*

WEST GULF FORECAST DISTRICT.

January was a wet, cold, and disagreeable month. High northerly winds, for which warnings were displayed, occurred on the coast on a few dates. Extensive and decided cold waves, for which timely warnings were issued, covered the entire district between the 11th and 14th and between the 24th and 26th. Warnings of frost and freezing temperatures were issued for the sugar, truck, and fruit sections along the coast on several dates, and no critical temperatures occurred without timely warnings.

The Daily States, New Orleans, of January 27, 1905, in commenting on the cold weather of the 26–27th, says:

The Weather Bureau distributed timely warnings, stating almost the exact degree of temperature recorded. This, when it is considered that 21.8° broke all previous records for the last ten days of January, shows that the Weather Bureau forecaster can be depended on not only under ordinary conditions but in exceptional cases.

The public was warned to protect vegetation and drain exposed pipes, and those who failed to heed the warning have suffered accordingly, for unprotected vegetation and pipes have been injured. The warning was of a value far beyond estimation to the masses who look for the information and protect accordingly.

I. M. Cline, District Forecaster.

NORTH-CENTRAL FORECAST DISTRICT.

The month was colder than usual over the greater portion of the district. The temperature was moderate early in the month, but after the first week, cold weather prevailed. The changes thereafter were not very important, and consequently cold-wave warnings were infrequent. Considerable snow fell, and the winter wheat region remained well covered during the larger portion of the month. No exceptionally heavy snow-storm occurred, however. Advisory messages were sent to open ports on Lake Michigan in advance of the few storms that passed over the Lake, but these storms were not usually of a decided character, and no casualties were reported.—*H. J. Cox, Professor and District Forecaster.*

ROCKY MOUNTAIN FORECAST DISTRICT.

Forecasts were issued from day to day for the precipitation that occurred in connection with the southwest low of the 8–12th. In western Colorado and northern Arizona the snow-fall was heavy; in other parts of Arizona heavy rains were continuous, causing extensive washouts on the railroads and delaying traffic for a number of days.

The cold waves were few and local in character, and there was no prolonged severe cold. Warnings were issued on the morning of the 11th for the cold wave that visited western Colorado and northern Arizona during the night of the 12th.

Cloudy weather with fog was a feature of the month, and the percentage of sunshine was proportionally small.—*F. H. Brandenburg, District Forecaster.*

NORTH PACIFIC FORECAST DISTRICT.

January in this district was mild and deficient in precipitation, and the winds, on the whole, were quiet. From the 9th until the close of the month a succession of high pressure areas of great magnitude and of slow movement were the dominating features in the Middle West. These high-pressure areas blocked the eastward progress of the north Pacific lows with the result that their movements were irregular and their behavior unusually erratic.

During the early morning of the 25th a severe squall, accompanied by thunder and lightning, swept down the Willamette Valley and thence north to Puget Sound. The wind rush was of short duration and fortunately no casualties of consequence resulted therefrom.

On the 13th, 14th, and 15th high easterly winds of a local character occurred on the Strait of Juan de Fuca, for which timely warnings were issued during the afternoon of the 12th. Warnings were also issued on other dates, and they were generally verified, although the justifying velocities were not greatly exceeded.—*Edward A. Beals, District Forecaster.*

SOUTH PACIFIC FORECAST DISTRICT.

The month as a whole was one of good rainfall and moderate temperatures. There were but few severe storms and no serious frosts. From an agricultural standpoint the month was all that could be desired, although in portions of the Sacramento Valley heavy rains resulted in broken levees and the overflowing of much grain land.

During the first decade the depressions apparent on the north Pacific coast moved northeastward, and this as a rule means pleasant weather in California. On January 9 a disturbance moved in over southern California. This was anticipated in the forecasts. This disturbance followed an easterly course and played an important part in connection with the great high of January 12. A depression of some depth appeared on the Washington coast on January 13 and marked a distinct change in pressure distribution. Somewhat similar types followed during the remainder of the month.—*Alexander G. McAdie, Professor and District Forecaster.*

RIVERS AND FLOODS.

Owing to the continued cold weather of January there was no material change in the ice situation, except a gradual increase in the thickness of the ice and an extension of its southern limit into middle and northern Virginia and the upper Tennessee watershed. At the end of the month there were 30 inches of ice at Moorhead, Minn., on the Red River of the North; 22 inches at St. Paul and 11 inches at St. Louis on the Mississippi River; and 24, 14, and 10 inches, respectively, at Bismarck, N. Dak., Omaha, Nebr., and Kansas City, Mo., on the Missouri River; there were also 3 inches of ice on the upper French Broad River at Asheville, N. C., and the river

was frozen over at Dandridge, Tenn., for the first time in five years. There was a heavy gorge in the Mississippi River back of Cairo, Ill., and heavy ice from the lower Ohio was passing Memphis, Tenn.

There were no floods of any considerable magnitude east of the Rocky Mountains, although the heavy rains of the 11th and 12th in the South caused a decided rise in the rivers of Alabama. Warnings that were issued at the proper time were remarkably accurate, and were the means of saving a large amount of property, especially lumber. While the stages reached did not exceed the danger line except in the Tombigbee basin, yet the long duration of the low-water season made the warnings of unusual benefit and importance.

The warm rains from the 20th to the 22d in northern California extended well up into the snow regions of the Sacramento watershed, and as a result the accumulated snow of the winter was melted and carried down into the Sacramento River. Warnings of the flood were issued on the 22d, and the people in the threatened districts in Glenn and Colusa counties made all preparations possible. In Colusa County, however, weak levees were broken, while the waters washed over others, destroying 25,000 acres of growing grain, practically all of this year's crop. At Red Bluff the highest stage reached was 24.5 feet, 1.5 feet above the danger line, while at Colusa it was 28.3 feet, 3.3 feet above the danger line, 0.2 of a foot above any previous record.

The Columbia River was unusually low, and steamboat traffic was absolutely suspended above the mouth of the Wenatchee River.

The highest and lowest water, mean stage, and monthly range at 268 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor.*

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Division.

The following summaries relating to the general weather and crop conditions during January are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3300 and 14,000, respectively:

Alabama.—Cold, wet, and unfavorable for farm work. Excessive rains of 11th and 12th washed lands badly in many localities and caused rivers to overflow lowlands. Very little more wheat and oats were sown; the fall sown was damaged by severe freeze during middle of last decade, when temperature was as low as 17° to the Gulf coast. Fruit trees and strawberry plants continued in good condition. Very little truck land was prepared.—*F. P. Chaffee.*

Arizona.—The month was warm and wet. Snowfall in mountains greater than for years, assuring abundant water supply. Range feed plentiful and cattle in splendid condition. Winter wheat well advanced, though retarded in growth by snow covering in northern counties. Plowing for spring wheat and barley extensive in south-central counties, and some seeding done. Excessive rainfall interfered with mining and caused some damage to railways and dams. Oranges and lemons marketed. Large yields of garden truck in southern counties.—*L. N. Jesunofsky.*

Arkansas.—The temperature was considerably below normal, while the precipitation was slightly in excess. There was more than the usual amount of snowfall. Very little progress was made in farm work. Small grain did fairly well, but the acreage was small. Stock was healthy, but in poor condition, except where fed. Fruit sustained no material injury from low temperatures.—*Edward B. Richards.*

California.—The temperature was considerably above normal most of the month, but severe frosts occurred in some sections, with very little injury to crops. The rainfall was abundant in all sections and thoroughly saturated the soil. There was some damage to grain by the overflow of rivers in portions of the Sacramento Valley. On the whole, crop conditions were better than at last report, and far better than at this time last year.—*Alexander G. McAdie.*

Colorado.—Live stock remained in fair condition, notwithstanding the cold spells, except over areas in the western valleys, where the ranges were poor. Stock water was ample. Snowfall was about normal, except in the northwestern part of the State, where a deficiency was reported. On January 31 there was about one-third more snow than a year ago at high elevations on the upper drainage areas of the Grand and Gunnison, and double the amount of a year ago on the watershed of the Arkansas and South Platte, while for the Rio Grande there was a marked excess.—*F. H. Brandenburg.*

Florida.—With one exception, in 1893, the month was the coldest January since the Climate and Crop Service was established, and, except in 1886, it was the coldest January in Jacksonville since the establishment of a weather station in that city. In many sections the previous minimum temperatures were reached. The greatest damage befell vegetables. The tenderer kinds, such as beans and tomatoes, were killed where not protected; the hardier kinds, such as onions, cabbages, celery, English peas, turnips, and cauliflower, were damaged about one-half. Considerable unprotected fruit was frosted. Some young trees will die, but, as a whole, orange groves suffered only the loss of foliage. Pineapples on the mainland were severely damaged; those on near-by islands escaped serious consequences. The month was deficient in moisture.—*A. J. Mitchell.*

Georgia.—Month noted for sudden and decided changes in temperature; first few days springlike, rest of time temperature below normal; severe cold wave 25th and 26th, temperature near zero in northern section. Rainfall somewhat below normal, smallest average in the central section; light snowfall in northern half 29th and 30th. Cold weather prevented farm work, except in southern section, and injured grains, some late oats killed; outlook still good; seeding spring oats progressing. Fruit prospects unimpaired; trees in good condition.—*J. B. Marbury.*

Idaho.—The month was warmer than any previous January on record, except that of 1900, and there was a marked deficiency in precipitation. The snowfall in the mountains was unusually light and shortage of water was feared. Winter grain was in good condition. Fruit trees did well, except that some buds were swelling prematurely. Hay was abundant and stock was in good condition.—*Edward L. Wells.*